

# Semiconductors, Printed Circuit Boards, Other Electronic Components: 2002

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### SUMMARY OF FINDINGS

During 2002, the total value of shipments of semiconductors, printed circuit boards, and other electronic components was \$111,407.0

million. This represents a 6.3-percent decrease from the revised 2001 total of \$118,868.2 million. The 2002 data include electron tubes and parts, \$2,705.4 million, a decrease of 26.3 percent from 2001; printed circuit boards, \$6,045.0 million, a decrease of 32.2 percent from 2001; semiconductors and related devices, \$63,604.4 million, an increase of 15.1 percent over the revised total from 2001. Capacitors decreased 25.0 percent to \$1,299.9 million; resistors decreased by 12.0 percent to \$682.9 million; coils and transformers had a 17.0-percent decrease to \$1,130.2 million; electronic connectors was \$3,303.0 million in 2002, compared to \$4,751.8 million in 2001, a decrease of 30.5 percent; and other electronic components decreased to \$32,636.2 million, from a revised 2001 total of \$42,377.1 million, a decrease of 23.0 percent.

For general CIR information, explanation of general terms and historical note, see the appendix.

Address inquiries concerning these data to Investment Goods Industries Branch, Manufacturing and Construction Division (MCD), Washington, DC 20233-6900, or call Philippe S.J. Morris, 301-763-4819.

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# U S C E N S U S B U R E A U

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Table 1. Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components by Class of Product: 1997 to 2002  
 [Value in million of dollars]

Product code	Product description	2002	2001	2000	1999	1998	1997
3344111	Transmittal, industrial, and special-purpose electron tubes (except X-ray).....	593.7	700.2	702.8	672.9	629.5	655.9
3344114	Receiving type electron tubes and cathode ray picture tubes.....	2,043.2	2,846.5	3,457.5	3,578.5	3,367.1	3,433.6
3344117	Electron tube parts.....	68.5	124.5	143.5	136.4	146.6	161.0
3344120	Printed circuit boards.....	6,045.0	8,910.9	11,891.8	9,149.9	8,473.2	8,702.4
3344131	Integrated microcircuits (semiconductor networks).....	55,772.0	46,337.1	73,663.7	62,868.4	57,643.5	57,019.4
3344134	Transistors.....	746.7	913.4	1,569.3	993.7	887.0	1,500.2
3344137	Diodes and rectifiers.....	281.1	402.6	620.6	1,038.3	907.6	1,190.5
334413A	Other semiconductor devices.....	6,804.6	7,631.9	9,757.0	11,745.4	11,055.8	10,262.3
3344140	Capacitors for electronic applications.....	1,299.9	1,733.9	2,786.1	2,035.1	1,946.9	2,098.7
3344150	Resistors.....	682.9	775.9	981.7	970.6	944.6	993.4
3344160	Coils, transformers, reactors, and chokes for electronic applications.....	1,130.2	1,362.4	1,718.8	1,422.5	1,368.3	1,425.7
3344171	Coaxial connectors.....	365.6	505.6	805.0	630.5	590.3	581.0
3344174	Cylindrical connectors.....	671.8	687.8	725.3	549.5	579.5	554.9
3344177	Rack and panel connectors.....	233.8	359.2	531.7	391.4	745.6	657.9
334417A	Printed circuit connectors.....	744.1	1,147.3	1,810.8	1,375.8	1,124.8	1,276.5
334417D	Other connectors, including parts.....	1,287.6	2,051.9	2,058.9	2,041.2	1,973.1	2,208.8
3344191	Filters (except microwave) and piezoelectric devices.....	718.2	984.0	1,167.9	857.5	797.5	814.7
3344194	Transducers, electrical/electronic input or output.....	1,154.1	1,330.5	1,519.3	1,330.7	1,372.7	1,219.6
3344197	Switches, mechanical types for electronic circuitry.....	839.6	827.7	902.6	883.4	882.5	791.2
334418A	Printed circuit assemblies.....	23,259.3	31,214.0	37,272.5	30,090.9	26,046.5	27,040.2
334419A	Microwave components and devices.....	1,598.5	1,847.8	2,435.1	1,621.6	1,580.7	1,439.8
334419D	All other electronic components, n.e.c. ....	5,066.6	6,173.1	8,331.6	7,275.7	7,322.4	7,484.7

n.e.c. Not elsewhere classified.

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 2002 and 2001  
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001	
			Quantity	Value	Quantity	Value
334411	Electron tubes.....	(NA)	(X)	2,705,381	(X)	3,671,062
3344111	Transmittal, industrial, and special-purpose electron tubes (except X-ray).....	31	(X)	593,691	(X)	700,160
	Power and special-purpose tubes:					
3344111105	High vacuum tubes, including triodes, multigrid external and internal anodes, diodes, and other.....	6	72	67,499	76	68,881
3344111110	Gas and vapor tubes, including ignitrona, gas duplexers, spark gaps and others.....	8	480	28,728	668	33,085
3344111115	Klystrons, including amplifier, reflex, and other.....	5	(D)	(D)	(D)	(D)
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other.....	4	9	45,217	(D)	(D)
	Traveling wave tubes (TWT):					
	Forward wave:					
3344111222	Continuous wave (CW).....	4	1,031	104,775	r/ 850	105,727
3344111232	Pulsed power.....	5	983	97,328	1,186	88,634
3344111265	Backward wave.....	1	(D)	(D)	-	-
3344111340	Light sensing tubes.....	6	(D)	(D)	80	98,333
3344111360	Light emitting devices, including storage tubes all sizes, cathode ray tubes, color and monochrome (industrial and military), special display devices, including alphanumeric readout tubes, figure indicating tubes, and other.....	8	187	54,005	r/ 355	r/ 99,580
3344111370	Miscellaneous special-purpose tubes (reference cavities, radiation detection (geiger, neutron counters, etc.), beam deflection, decade counters, orbital beam, vacuum gauges, vacuum capacitors, switches, relays, etc.).....	7	(X)	75,572	(X)	105,506
3344114	Receiving type electron tubes and cathode ray picture tubes.....	(NA)	(X)	2,043,213	(X)	2,846,454
3344114105	Receiving type electron tubes, all types, including rebuilt.....	1	(D)	(D)	(D)	(D)
	Television tubes, including any defective tube that has been rebuilt:					
	Color having a video display diagonal of:					
3344114110	50 cm and under (20 inches and under) 1/.....	6	(D)	(D)	(D)	(D)
3344114115	Over 50 cm but not exceeding 63 cm (21 through 25 inches) 1/.....	2	11,647	596,344	r/ 13,776	r/ 894,976
3344114120	Exceeding 63 cm (26 inches and over).....	7	9,715	1,365,633	r/ 13,027	r/ 1,855,688
3344114125	Other, including rebuilt color and new and rebuilt black and white.....	5	(D)	(D)	(D)	(D)
3344117130	Electron tube parts (except glass blanks): bases, getters, cathodes, headers, guns.....	15	(X)	68,477	(X)	r/ 124,448
334412	Printed-circuit (wiring) boards.....	479	(X)	6,045,029	(X)	8,910,912
3344120105	Single-sided glass printed.....	229	(X)	165,072	(X)	r/ 204,740
3344120210	Double-sided glass printed.....	318	(X)	917,396	(X)	1,090,562
3344120315	Multilayer glass printed.....	310	(X)	2,997,284	(X)	4,950,972
3344120420	Single-sided flex printed.....	41	(X)	438,111	(X)	404,206
3344120425	Double-sided flex printed.....	40	(X)	82,395	(X)	113,131
3344120430	Multilayer flex and rigid/flex printed.....	48	(X)	169,943	(X)	234,443
3344120432	Back-bared flex printed boards.....	-	(X)	-	(X)	-
3344120433	Sculptured flex printed boards.....	-	(X)	-	(X)	-
3344120435	All paper/mat/composite printed boards.....	14	(X)	22,461	(X)	15,068
3344120440	Other substitute printed boards.....	54	(X)	649,691	(X)	1,273,266
3344120545	Receipts for contract work on printed circuit boards (etching, dip-soldering, imprinting, etc.), but not printed board assembly.....	59	(X)	602,676	(X)	624,524
334413	Semiconductors and related devices.....	(NA)	(X)	63,604,391	(X)	55,284,998
3344131	Monolithic integrated circuits.....	176	19,946,132	55,772,004	17,268,608	46,337,103
	Monolithic integrated circuits, digital, nonsilicon (e.g., gallium arsenide):					
3344131136	Memory.....	5	(D)	(D)	(D)	(D)
3344131148	Logic and other.....	9	127,045	871,482	134,917	639,364
	Monolithic integrated circuits, digital, silicon:					
	Bipolar transistors, memory:					
3344131115	Static read-write random access (SRAM) 2/.....	7	(D)	(D)	(D)	(D)
3344131121	Other memory 2/.....	5	51,520	236,480	13,309	79,664
	Other bipolar transistors, including logic:					
3344131124	Transistor-transistor logic (TTL).....	12	(D)	(D)	150,962	550,936
3344131132	Other, including emitter couple logic (ECL).....	12	1,810,264	1,574,568	r/ 1,830,885	r/ 2,057,769

Continued

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 2002 and 2001  
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001	
			Quantity	Value	Quantity	Value
Metal oxide semiconductor (MOS) field effect transistors:						
Volatile memory DRAMS (dynamic read-write random access):						
3344131168	Not over 3 MB 3/.....	4	(D)	(D)	(D)	(D)
3344131170	Over 3 MB but not over 15 MB 3/.....	1	4,629	8,561	5,212	11,272
3344131172	Over 15 MB.....	9	976,165	4,461,606	r/ 998,972	r/ 3,067,277
Volatile memory SRAMS (static read-write random access):						
3344131182	Not over 40 k 4/.....	3	(D)	(D)	(D)	(D)
3344131184	Over 40 k but not over 80 k 4/.....	2	33,886	54,829	36,714	58,722
3344131186	Over 80 k .....	15	102,254	574,424	r/ 130,862	1,043,199
Nonvolatile EEPROMs (electrically erasable programable read-only memory):						
3344131192	Not over 80 k 5/.....	7	1,558,107	1,557,546	r/ 1,411,194	r/ 1,126,512
3344131194	Over 80 k 5/.....	10	(D)	(D)	(D)	(D)
3344131179	Nonvolatile EPROMs (erasable, except electrically, programable read-only memory).....	9	45,511	70,876	r/ 181,817	r/ 451,720
3344131180	Other nonvolatile memory.....	8	438,832	1,165,811	631,900	r/ 2,793,920
Other, including microprocessors, controllers, application specific integrated circuits (ASIC's), and programmable logic arrays (PLA's):						
3344131154	Microprocessors having an internal data bus of 8 bits or less.....	13	882,394	906,172	r/ 825,954	r/ 870,780
3344131157	Microprocessors having an internal data bus of 16 bits 6/.....	11	(D)	(D)	(D)	(D)
3344131160	Microprocessors having an internal data bus of 32 bits or more 6/.....	14	330,123	19,817,348	r/ 317,372	r/ 15,094,853
3344131133	Other (microcontrollers, ASICs, PLA's, etc.).....	28	1,313,691	5,756,375	1,211,016	5,940,174
Other digital, silicon, including bipolar combined with MOS:						
3344131139	Complementary BiMOS (BiCMOS).....	4	(D)	(D)	3,111,162	r/ 835,239
3344131142	Other complementary BiMOS(BiCMOS), including logic.....	13	363,317	1,079,095	331,452	r/ 559,640
3344131145	Other digital silicon ICs.....	21	(D)	(D)	1,062,640	1,675,366
Nondigital silicon monolithic integrated circuits (e.g., linear, analog):						
3344131162	Radio frequency.....	8	189,662	471,346	136,527	306,150
3344131103	Other, analog.....	25	2,407,821	1,568,958	r/ 2,294,207	r/ 1,663,474
3344131106	Other, including mixed signal (analog and digital), logic.....	16	503,515	795,298	r/ 545,859	r/ 1,069,121
3344131109	Other, including mixed signal (analog and digital), other.....	20	1,037,445	2,903,617	704,812	r/ 2,616,003
Hybrid integrated circuits:						
3344131118	Radio frequency.....	23	136,351	226,187	283,193	r/ 696,128
3344131151	Other.....	41	100,680	581,127	r/ 135,443	733,977
3344131112	Other.....	44	672,991	1,781,239	r/ 597,941	r/ 2,007,304
3344134	Transistors.....	34	(X)	746,707	(X)	913,426
3344134105	Signal (less than 1 watt dissipation).....	18	(X)	72,083	(X)	r/ 101,122
3344134110	Power (1 watt or greater dissipation).....	28	(X)	674,624	(X)	r/ 812,304
3344137	Diodes and rectifiers.....	45	249,584	281,059	408,555	402,617
3344137110	Signal diodes and assemblies thereof (maximum current 0.5 amps).....	15	11,868	6,236	20,885	11,165
3344137115	Semiconductor rectifiers/power diodes and assemblies thereof (current rating greater than 0.5 amps).....	27	134,313	123,097	r/ 185,139	161,951
3344137125	Zener diodes (voltage regulator and voltage reference diodes) 7/.....	18	18,739	20,447	112,342	90,393
3344137105	Selenium rectifiers 7/.....	4	(D)	(D)	(D)	(D)
3344137120	Microwave diodes (mixers, detectors, varactors, parametric, harmonic generators, etc.).....	10	84,664	131,279	90,189	139,108
334413A	Other semiconductor devices.....	159	(X)	6,804,621	(X)	7,631,852
334413A105	Solar cells.....	14	(X)	133,029	(X)	122,069
334413A110	Photovoltaic modules.....	11	(X)	162,583	(X)	142,794
Light-emitting diodes (LEDs):						
334413A115	Discrete, infrared and laser.....	18	(X)	253,104	(X)	383,131
334413A120	Alpha or numeric displays.....	7	(X)	(D)	(X)	(D)
334413A125	Photodiodes, including infrared detectors.....	16	(X)	144,842	(X)	200,259
334413A130	Optical coupled isolators, including sensors and emitters.....	4	(X)	(D)	(X)	(D)
334413A135	Other light sensitive and light-emitting devices, including photovoltaic devices and photoelectric-photoelectric-magnetic devices.....	12	(X)	145,368	(X)	243,064
Other semiconductor devices:						
334413A140	Thyristors (SCR's, triacs, PNP diodes).....	7	(X)	96,309	(X)	96,235

Continued

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 2002 and 2001  
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001	
			Quantity	Value	Quantity	Value
334413A150	All other semiconductor devices (tunnel diodes, thermoelectric semiconductor junctions, metal-oxide varistors, solidstate transducers, and special semiconductor devices, n.e.c.).....	13	(X)	282,674	(X)	653,193
	Semiconductor parts:					
	Chips and wafers:					
334413A155	For integrated circuits (IC's).....	37	(X)	3,595,628	(X)	r/ 3,755,821
334413A160	For discrete semiconductors.....	30	(X)	300,882	(X)	r/ 326,043
334413A165	All other semiconductor parts (headers, packages, heat sinks, other accessories, etc.).....	48	(X)	1,620,749	(X)	r/ 1,613,369
334414	Capacitors.....	93	(X)	1,299,906	(X)	1,733,891
	Paper, plastic (film), metalized, and dual (film/paper) dielectric capacitors, fixed:					
	Ac types:					
3344140103	Less than 300 volts.....	17		14,704	16,355	28,623
3344140106	300 volts to 599 volts.....	19		33,488	36,243	74,232
3344140109	600 volts to 999 volts.....	12		4,036	7,955	6,487
3344140112	1,000 volts or over.....	9		907	1,050	8,920
	Capacitors having a reactive power handling capacity of 0.5 kVAR or less:					
	Dc types/other:					
3344140215	Axial lead.....	19		20,363	22,872	39,047
3344140218	Radial lead.....	9		55,856	38,410	16,644
3344140221	Chips and other leaded devices.....	1	(D)	(D)	(D)	(D)
3344140331	Tantalum electrolytic 8/.....	11		61,046	322,542	172,538
3344140333	Other leaded (molded axial and molded radial) 8/.....	2	(D)	(D)	(D)	(D)
	Aluminum electrolytic:					
3344140436	Less than 18 mm through 35 mm 9/.....	5	(D)	(D)	(D)	(D)
3344140439	Small can style (over 35mm through 51 mm).....	5		407	707	2,715
3344140442	Other can style (over 51 mm).....	6		6,182	9,974	70,112
3344140445	Ac motor start 9/.....	1		45,568	55,003	80,878
3344140550	Ceramic dielectric, single layer.....	7	(D)	(D)	r/ 115,764	r/ 26,401
	Ceramic dielectric, multilayer:					
3344140555	Axial leads and radial leads.....	9		51,685	31,390	r/ 115,321
3344140560	Chips.....	18		35,667,365	465,169	r/ 33,665,353
	Other:					
3344140663	Mica dielectric.....	7		8,852	7,262	10,127
3344140666	All other fixed.....	20		99,952	77,355	r/ 101,520
	Variable:					
3344140769	Mica, ceramic or glass dielectric 10/.....	4	(D)	(D)	(D)	(D)
3344140772	Other 10/.....	6		19,308	39,009	20,142
3344140875	Parts of capacitors, including unfinished chips for further finishing and assembly.....	13	(X)	(D)	(X)	(D)
334415	Resistors.....	92	(X)	682,901	(X)	775,907
3344150104	Fixed carbon resistors, composition or film types.....	14		41,544	16,532	39,287
	Other fixed resistors (power capacity 20W or less):					
	Surface mounted, having two terminals:					
3344150208	Flat resistor chips.....	21		171,402	50,238	224,661
3344150212	Cylindrical leadless resistors, including metal film, metal oxide, and thick cermet film.....	6		131,034	13,578	(D)
	Surface mounted, having more than two terminals (resistor networks):					
3344150216	Dual-in-line package.....	8		44,331	12,262	84,774
3344150220	Other, including flat packs.....	10		2,516	5,866	4,259
	Resistors, having two leads:					
3344150224	Wirewound.....	19		52,722	47,859	r/ 81,725
3344150228	Other, including metal film, metal oxide, and thick cermet film.....	15		233,298	60,620	347,980
	Resistor networks, having more than two leads:					
3344150232	Single-in-line.....	15		37,882	16,622	54,233
3344150236	Dual-in-line.....	9		18,707	7,519	17,525
3344150240	Other.....	9		55,643	41,314	58,306
	Variable, nonwirewound:					
	Trimmers:					
3344150344	Single-turn, carbon and other film 11/.....	5		17,562	11,488	9,701
3344150348	Multiturn, carbon and other film 11/.....	4	(D)	(D)	(D)	(D)
3344150359	Potentiometers, precision and panel type.....	12		17,955	97,807	r/ 17,548

Continued

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 2002 and 2001  
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001	
			Quantity	Value	Quantity	Value
3344150468	Variable, wirewound: Variable wirewound (except potentiometers), including nonprecision and trimmers.....	2	(D)	(D)	(D)	(D)
3344150469	Potentiometers, precision and panel type.....	11	2,136	27,041	r/ 1,784	r/ 19,872
3344150576	Miscellaneous: Varistors.....	7	(D)	(D)	(D)	(D)
3344150580	Thermistors, bead type, disc, rod.....	13	195,343	88,131	r/ 293,433	r/ 130,001
3344150684	Parts for resistors.....	10	(X)	150,449	(X)	r/ 120,764
334416	Coils, transformers, reactors, and chokes for electronic applications.....	232	(X)	1,130,208	(X)	1,362,392
3344160120	Audio frequency (AF) transformers.....	76	10,692	62,787	20,741	79,881
3344160125	Low frequency (LF) chokes.....	87	14,565	60,256	16,801	70,359
3344160130	Plate and filament transformers, including autotransformers (except toroidal).....	54	11,086	92,122	11,786	109,900
3344160135	Pulse transformers, computer, and other types.....	79	14,013	72,083	41,996	124,243
3344160105	Radio frequency (RF) chokes.....	35	28,271	22,093	39,900	29,564
3344160110	Radio frequency (RF) coils.....	38	138,774	58,713	159,201	79,088
3344160115	Intermediate frequency (IF) transformers.....	33	16,864	31,973	34,471	r/ 63,954
3344160140	Television transformers and reactors (horizontal output, vertical deflection, focus coils, deflection yokes, etc.) 12/.....	17	(D)	(D)	(D)	(D)
3344160145	Toroidal windings (transformers and reactors) (except complete magnetics amplifiers) 12/.....	103	257,000	226,310	280,062	r/ 275,717
3344160150	Other (balun coils, permeability tuning devices, etc.).....	91	(X)	503,871	(X)	r/ 529,686
334417	Electronic connectors.....	(NA)	(X)	3,302,964	(X)	4,751,784
3344171	Coaxial (RF) connectors.....	47	383,444	365,632	587,645	505,599
3344171105	Miniature (BNC, PNC, MHB).....	24	43,182	44,583	101,284	82,910
3344171110	Subminiature (SMA, SMB, SMC).....	27	49,142	71,395	118,360	130,860
3344171115	Other standard and precision.....	39	291,120	249,654	368,001	291,829
3344174	Cylindrical connectors.....	45	244,562	671,842	219,774	687,756
3344174105	Heavy duty and standard.....	32	197,917	434,242	171,737	421,432
3344174110	Miniature.....	16	11,492	72,689	13,713	84,700
3344174115	Subminiature.....	16	35,153	164,911	r/ 34,324	r/ 181,624
3344177	Rack and panel (rectangular) connectors.....	39	603,394	233,797	1,008,226	359,228
3344177105	Integral shell, Mil-C-22857 (8434) and similar types.....	22	349,540	74,216	555,053	134,961
3344177110	Subminiature: Ribbon, including planar cable type.....	6	(D)	(D)	(D)	(D)
3344177115	D-Subminiature, including planar cable type.....	16	(D)	(D)	(D)	(D)
3344177120	Microminiatures.....	11	14,327	67,650	r/ 21,961	r/ 81,042
334417A	Printed circuit connectors.....	54	3,962,103	744,106	4,248,582	1,147,307
334417A105	Card insertion types.....	29	79,001	68,429	173,084	100,726
334417A110	Two-piece types: Post, header and receptacle type.....	34	3,474,900	320,758	3,625,776	r/ 540,379
334417A115	Other two-piece types.....	26	408,202	354,919	449,722	506,202
334417D	Other connectors, including parts.....	99	(X)	1,287,587	(X)	2,051,894
334417D105	Hermetic sealed (except single-contact and coaxial types) 13/.....	19	(D)	(D)	(D)	(D)
334417D110	Plate module types 13/.....	6	(D)	(D)	(D)	(D)
334417D115	Fiber optic connectors.....	13	86,129	252,714	r/ 159,004	r/ 725,628
334417D130	Other planar cable (flat conductor or ribbon cable), excluding rack and panel (rectangular types) 13/.....	24	392,570	233,258	336,723	286,250
334417D120	Miscellaneous special purpose.....	62	1,155,592	694,307	1,483,088	r/ 919,789
334417D125	Parts for connectors (connectors shipped but still requiring further manufacture).....	20	(X)	107,308	(X)	120,227
334419	Electronic components and subassemblies, n.e.c. ....	(NA)	(X)	32,636,148	(X)	42,377,080
3344191	Filters (except microwave) and piezoelectric devices.....	108	286,809	718,177	318,965	984,018
33441911	Filters (except microwave).....	(NA)	61,067	208,604	129,435	306,406
3344191105	Mechanical, excluding optical lenses (germanium silicon, fused quartz, rock salt, and other).....	6	615	38,346	615	37,614
3344191110	Radio frequency interference/electro magnetic interference (RFI/EMI) control filters: Ceramic dielectric.....	13	44,004	63,925	49,514	r/ 103,833
3344191115	Combination or other dielectric.....	18	13,605	72,361	76,279	131,291
3344191120	Electronic wave filters (LC band and high pass).....	18	2,843	33,972	3,027	33,668
33441912	Piezoelectric devices.....	(NA)	225,742	509,573	189,530	677,612

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 2002 and 2001  
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001	
			Quantity	Value	Quantity	Value
	Oscillator crystals:					
3344191225	AT-cut.....	26	1,902	15,496	3,149	31,790
3344191230	Other.....	8	(D)	(D)	(D)	(D)
	Crystal oscillators:					
3344191235	Oven.....	7	104	24,818	r/ 317	r/ 48,918
3344191240	TCXO/VCXO.....	11	2,409	34,692	4,247	77,036
3344191245	Hybrid.....	14	3,457	47,700	4,762	56,538
3344191250	Other.....	10	3,745	53,231	4,650	74,774
	Crystal filters:					
3344191255	Monolithic, including filter crystals and/or monolithic filter units not assembled into filters.....	4	(D)	(D)	(D)	(D)
3344191260	Packaged AT-cut, including monolithic, tandem monolithic, and resonator filter assemblies.....	4	30	1,677	r/ 55	r/ 3,098
3344191265	Other.....	9	138,931	76,650	80,374	77,089
	Crystal blanks:					
3344191270	AT-cut.....	7	4,278	6,655	r/ 9,887	10,754
3344191275	Other.....	15	28,421	189,229	30,338	r/ 219,306
3344194	Transducers, electrical/electronic I/O, n.e.c. ....	86	128,571	1,154,050	165,021	1,330,506
3344194105	Electroacoustic (sonar, ultrasonic, vibration*, etc.).....	15	25,663	137,392	35,348	152,654
	Electromechanical:					
3344194110	Accelerometers*.....	11	8,528	151,424	r/ 10,405	r/ 146,788
3344194115	Pressure*.....	35	58,626	447,050	65,876	r/ 506,822
3344194120	Strain gauges and other mechanical*.....	17	1,189	80,023	1,659	r/ 110,516
3344194125	Thermoelectric (pyrometers, thermocouples*, etc.).....	7	5,131	68,294	r/ 7,035	r/ 74,742
3344194130	Other (optical, chemical, magnetic, nuclear*, etc.).....	25	29,434	269,867	r/ 44,698	r/ 338,984
3344197	Switches, mechanical types for electronic circuitry.....	77	(X)	839,616	(X)	827,651
3344197120	Slide, including rocker, miniature and subminiature*.....	10	(X)	20,286	(X)	34,510
3344197125	Rotary selector, including lever and jog-lever, miniature and subminiature*.....	16	(X)	55,545	(X)	r/ 64,651
3344197130	Keyboard* 14/.....	10	(X)	(D)	(X)	(D)
3344197135	Pushbutton*.....	20	(X)	59,870	(X)	66,022
3344197140	Snap-action*.....	12	(X)	31,527	(X)	39,272
3344197145	Thumbwheel* 14/.....	2	(X)	63,368	(X)	61,297
3344197115	Membrane.....	17	(X)	86,654	(X)	95,745
3344197105	Toggle standard type.....	8	(X)	21,622	(X)	23,754
3344197110	Toggle miniature and subminiature 15/.....	6	(X)	(D)	(X)	(D)
3344197150	DIP 15/.....	4	(X)	26,572	(X)	37,346
3344197155	Other.....	39	(X)	474,172	(X)	r/ 405,054
334418A	Printed circuit assemblies (loaded boards, subassemblies and modules) 16/.....	654	(X)	23,259,268	(X)	31,214,042
334418A105	Computer and peripheral printed board assemblies 16/.....	241	(X)	7,775,672	(X)	11,656,836
334418A110	Communications printed board assemblies 16/.....	213	(X)	6,470,376	(X)	9,012,012
334418A115	Industrial process control board assemblies 16/.....	214	(X)	1,097,386	(X)	1,105,225
334418A120	Instrumentation printed board assemblies (except industrial process) 16/.....	176	(X)	1,737,762	(X)	2,162,293
334418A125	Search and detection printed board assemblies 16/.....	56	(X)	124,637	(X)	100,859
334418A130	Consumer electronics, printed board assemblies 16/.....	117	(X)	718,609	(X)	r/ 604,005
334418A135	Other electronics, printed board assemblies, including office equipment and point of sales 16/.....	272	(X)	5,334,826	(X)	6,572,812
334419A	Microwave components and devices (except antenna), tubes, and semiconductors.....	114	(X)	1,598,475	(X)	1,847,759
334419A105	Ferrite, including yttrium garnets, microwave components (circulators, isolators, phase shifters, attenuators, equalizers, limiters, mixers, etc.).....	34	(X)	281,988	(X)	r/ 335,308
	Microwave devices, other than ferrite and solid state:					
334419A110	Attenuators (dummy loads, high and low-power terminations, etc.).....	35	(X)	106,074	(X)	135,740
334419A115	Cavities (amplifier cavities, coaxial tuned cavities, etc.).....	14	(X)	33,346	(X)	r/ 42,220
334419A120	Couplers (directional couplers, hybrid junctions, etc.).....	27	(X)	51,088	(X)	57,943
334419A125	Reactive microwave components, n.e.c. ....	35	(X)	436,925	(X)	r/ 552,931
334419A130	Switches, coaxial and waveguide.....	28	(X)	99,170	(X)	r/ 76,247
334419A135	Rigid waveguide and fittings (bend and twists, couplings, flanges, other simple waveguide components, n.e.c.).....	18	(X)	66,591	(X)	r/ 58,787
334419A140	Flexible waveguides and fittings.....	10	(X)	29,473	(X)	36,905
334419A145	Other microwave components (except ferrite devices) (coaxial to waveguide and other transitions, duplexers and diplexers, holders and mounts, linear and circular polarizers, magnetron test plumbing, rotary joints and sector scan joints, mixer arrays, shutters, tuners, windows, etc.).....	36	(X)	242,949	(X)	273,888

Table 2. Quantity and Value of Shipments of Semiconductors, Printed Circuit Boards, and Other Electronic Components: 2002 and 2001  
 [Quantity in thousands of units. Values in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001	
			Quantity	Value	Quantity	Value
334419A150	Microwave subassemblies, including parametric amplifiers and other solid-state assemblies.....	22	(X)	250,871	(X)	r/ 277,790
334419D	Electronic components and subassemblies, n.e.c. ....	489	(X)	5,066,562	(X)	6,173,104
334419D102	Magnetic recording and reproducing heads, including audio, video, digital and instrumentation.....	7	1,460	18,331	2,439	25,876
334419D120	Delay lines (distributed constant, lumped constant, magnetostrictive, ultrasonic, etc.).....	11	1,157	14,300	3,366	33,621
334419D125	Oscillators (except instrumentation and crystal types).....	21	9,215	146,834	16,768	235,455
	Static power supply converters for electronic applications, sold separately:					
334419D130	Regulated.....	62	29,929	977,215	r/ 39,492	1,261,785
334419D135	Other (unregulated, variable frequency, ac, dc, converters and inverters, vibrator, etc.).....	39	(X)	297,847	(X)	r/ 452,365
334419D140	Electronic cable harnesses and cable assemblies.....	248	(X)	1,817,009	(X)	2,226,110
334419D145	Cryogenic cooling devices (cryostats, etc.) for infrared detectors, masers.....	3	(X)	(D)	(X)	r/ 16,872
334419D150	Liquid crystal displays (LCD) and other liquid devices.....	16	(X)	70,685	(X)	r/ 65,579
334419D155	Magnetic cores.....	13	(X)	135,956	(X)	180,972
	Electronic parts, n.e.c. and specialized electronic hardware:					
	Sockets for electronic component insertion:					
334419D165	Integrated circuit sockets.....	19	(X)	45,236	(X)	69,723
334419D160	Other, including tube, relay, discrete semiconductors, ac and dc converters and inverters, etc. ....	16	(X)	31,857	(X)	r/ 42,487
336322C119	Electronic control modular chips for motor vehicles.....	3	(X)	(D)	(X)	128,327
334419D170	All other electronic parts and specialized electronic hardware, n.e.c. ....	122	(X)	1,445,294	(X)	r/ 1,433,932
	Electronic research, development, testing, and evaluation (receipts or billings, not reported as shipments of specific products):					
9998042	Systems.....	14	(X)	95,656	(X)	110,992
9998043	Equipment and subassemblies.....	23	(X)	(D)	(X)	223,369
9998044	Component parts.....	18	(X)	63,245	(X)	67,430
9998046	Basic scientific electronic research.....	17	(X)	102,202	(X)	93,321
9998047	Design and engineering services.....	61	(X)	(D)	(X)	(D)
9998048	Software.....	5	(X)	(D)	(X)	(D)
9998049	Testing.....	11	(X)	6,192	(X)	r/ 10,079
9998050	Supplies and accessories sold with components.....	5	(X)	620	(X)	6,769

\*Similar products are collected on Current Industrial Report series MA335A, "Switchgear and Industrial Controls" and MA335K, "Wiring Devices and Supplies." - Represents zero. D Withheld to avoid disclosing data for individual companies. NA Not available. n.e.c. Not elsewhere classified. r/Revised by 5 percent or more from previously published data. X Not applicable.

- 1/Product code 3344114110 is combined with product code 3344114115 to avoid disclosing data for individual companies.
- 2/Product code 3344131115 is combined with product code 3344131121 to avoid disclosing data for individual companies.
- 3/Product code 3344131168 is combined with product code 3344131170 to avoid disclosing data for individual companies.
- 4/Product code 3344131182 is combined with product code 3344131184 to avoid disclosing data for individual companies.
- 5/Product code 3344131192 is combined with product code 3344131194 to avoid disclosing data for individual companies.
- 6/Product code 3344131157 is combined with product code 3344131160 to avoid disclosing data for individual companies.
- 7/Product code 3344137125 is combined with product code 3344137105 to avoid disclosing data for individual companies.
- 8/Product code 3344140331 is combined with product code 3344140333 to avoid disclosing data for individual companies.
- 9/Product code 3344140436 is combined with product code 3344140445 to avoid disclosing data for individual companies.
- 10/Product code 3344140769 is combined with product code 3344140772 to avoid disclosing data for individual companies.
- 11/Product code 3344150344 is combined with product code 3344150348 to avoid disclosing data for individual companies.
- 12/Product code 3344160140 is combined with product code 3344160145 to avoid disclosing data for individual companies.
- 13/Product codes 334417D105 and 334417D110 are combined with product code 334417D130 to avoid disclosing data for individual companies.
- 14/Product code 3344197130 is combined with product code 3344197145 to avoid disclosing data for individual companies.
- 15/Product code 3344197110 is combined with product code 3344197150 to avoid disclosing data for individual companies.
- 16/These data are collected on two Current Industrial Report forms, MA334R, "Computers and Office and Accounting Machines," and MA334Q, "Semiconductors, Printed Circuit Boards, and Other Electronic Components."



Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronics Components: 2002  
 [Values in Thousands]

Product code	Product description	Manufacturers' shipments (value, f.o.b. plant)	Exports of domestic merchandise (value at port) 1/	Imports for consumption 2/
3344111105	High vacuum tubes.....	67,499	40,666	13,266
3344111110	Gas and vapor tubes.....	28,728	5,384	439
3344111115	Klystrons, including amplifier, reflex and other.....	(D)	44,505	83,614
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field, continuous wave and other.....	45,217	9,752	18,062
3344111340	Light sensing tubes.....	(D)	49,782	90,928
3344114105	Receiving type electron tubes, including rebuilt.....	(D)	19,386	6,932
3344114110, 115, 120, 125	Television tubes, color, and black and white new and rebuilt.....	(D)	1,614,538	332,081
3344117130	Electron tube parts (except glass blanks).....	68,477	107,737	256,080
3344120105, 210, 315, 420, 425, 430, 432, 433, 435, 440	Printed circuit boards.....	6,045,029	1,852,502	1,652,178
3344131148	Monolithic integrated circuits, digital (except memory and silicon).....	871,482	354,798	172,456
3344131124, 132, 133, 142, 145	Monolithic integrated circuits, digital, silicon, (except memory, n.e.c.).....	(D)	2,318,571	2,283,466
3344131168, 170, 172	Monolithic integrated circuits, digital, silicon: With volatile memory (DRAM).....	4,470,167	1,239,248	2,569,934
3344131115, 182, 184, 186	With volatile memory (SRAM).....	(D)	202,793	521,120
3344131192, 194	Except volatile memory, electrically (EEPROM).....	1,557,546	271,772	1,694,849
3344131179	Except volatile memory (except electrically (EPROM)).....	70,876	91,914	119,394
3344131121, 139, 180	Except volatile memory, n.e.c. ....	(D)	332,542	366,393
	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except memory type):			
3344131154	Microprocessors 8 bits or less.....	906,172	182,339	938,595
3344131157	Microprocessors 16 bits 3/.....	(D)	182,497	483,715
3344131160	Microprocessors 32 bits or more 3/.....	19,817,348	1,216,065	3,431,487
3344131162, 103, 106, 109	Monolithic integrated circuits, nondigital, silicon, including linear, analog, radio frequency, etc. ....	5,739,219	1,881,393	3,773,542
3344131118, 151	Hybrid integrated circuits.....	807,314	571,719	462,463
3344140331	Capacitors, fixed, tantalum electrolytic, metal case, dipped, chips, including foil and wet 4/.....	98,953	69,524	176,062
3344140333	Capacitors, fixed, tantalum electrolytic, n.e.c., including leaded 4/.....	(D)	27,546	103,828
3344140436	Capacitors, fixed, aluminum electrolytic, not exceeding 35 mm.....	(D)	45,519	211,343
3344140439, 442, 445	Capacitors, fixed, aluminum electrolytic, over 35 mm.....	(D)	11,658	28,390
3344140550	Capacitors, fixed, ceramic dielectric, single layer.....	(D)	31,345	29,904
3344140555	Capacitors, fixed, ceramic dielectric, multilayer, axial leads and radial leads.....	31,390	91,957	65,350
3344140560	Capacitors, fixed, ceramic dielectric, multilayer, chips.....	465,169	324,818	539,891
3344140663	Capacitors, fixed, mica dielectric .....	7,262	3,125	2,034
3344140666	Capacitors, fixed, n.e.c. ....	77,355	102,813	50,333
3344140769	Capacitors, variable, mica/ceramic/glass dielectric 5/.....	(D)	85,584	4,380
3344140772	Capacitors, variable, n.e.c. 5/.....	39,009	36,553	23,401
3344140875	Capacitors, parts, including unfinished chips for further finishing.....	(D)	328,202	31,806
3344140103	Capacitors, fixed, ac type, less than 300 volts.....	27,420	7,435	14,739
3344140106	Capacitors, fixed, ac type, 300-599 volts.....	69,660	1,619	27,244
3344140109	Capacitors, fixed, ac type, 600-999 volts.....	7,760	237	2,346
3344140112	Capacitors, fixed, ac type, 1,000 volts or more.....	8,452	6,473	812
3344140215	Capacitors, fixed, dc type, axial .....	33,778	607	1,472
3344140218	Capacitors, fixed, dc type, radial .....	19,219	1,807	41,890
3344140221	Capacitors, fixed, dc type, chips and other leaded.....	(D)	4,771	16,907
3344134105	Transistors, signal, less than 1 watt dissipation.....	72,083	103,044	220,844
3344134110	Transistors, signal, 1 watt or greater dissipation.....	674,624	219,897	744,973
3344137110	Signal diodes and assemblies.....	6,236	16,781	27,401
3344137125	Zener diodes.....	(D)	39,456	93,185
3344137115, 105	Diodes and rectifiers, n.e.c. ....	(D)	187,729	438,680
3344137120	Microwave diodes.....	131,279	47,590	68,711
334413A105	Solar cell.....	133,029	222,113	133,290
334413A115, 120	Light-emitting diodes.....	(D)	265,823	459,753
334413A130	Optical coupled isolators.....	(D)	40,897	141,342
334413A135	Other light-sensitive and light-emitting devices.....	145,368	102,988	112,145
334413A140	Thyristors, SCR's, triacs, and PNP diodes.....	96,309	49,114	144,757
334413A155	Chips and wafers for integrated circuits.....	3,595,628	19,610,182	1,968,331
334413A160	Chips and wafers for discrete semiconductors.....	300,882	1,401,737	183,813
334413A165	Other semiconductor parts.....	1,620,749	252,674	122,436

Continued

Table 3. Shipments, Exports, and Imports of Semiconductors, Printed Circuit Boards, and Other Electronics Components: 2002  
 [Values in Thousands]

Product code	Product description	Manufacturers' shipments (value, f.o.b. plant)	Exports of domestic merchandise (value at port) 1/	Imports for consumption 2/
3344150104	Carbon resistors, fixed, composition or film types, designed for surface mounting (SMD) by contact, having two terminals, cylindrical leadless having two leads, carbon composition, and carbon film.....	16,532	28,983	14,833
3344150208, 212	Carbon resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having two terminals, flat resistor chips, and cylindrical leadless resistors.....	63,816	18,158	89,829
3344150216, 220	Carbon resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having more than two terminals, resistor, resistor-capacitor networks.....	18,128	26,189	18,042
3344150224	Resistors, fixed, with a power capacity of 20 watts or less, wire-bound, having two leads.....	47,859	12,313	26,465
3344150228	Resistors, fixed, with a power capacity of 20 watts or less, other than wirebound, having two leads.....	60,620	31,696	43,425
3344150232, 236, 240	Resistors, fixed, with a power capacity of 20 watts or less, resistor networks, having more than two leads.....	65,455	35,167	31,661
3344150468, 469	Resistors, variable, wirewound, including rheostats and potentiometers, for a power handling capacity not exceeding 20 watts.....	(D)	49,521	19,952
3344150344, 348, 359, 576, 580	Resistors, variable, n.e.c. ....	(D)	138,151	298,461
3344150684	Resistors, parts .....	150,449	49,420	35,712
3344191225, 230, 235, 240, 245, 250, 255, 260, 265	Piezoelectric devices (except crystal blanks).....	(D)	127,355	424,705
3344191270, 275	Piezoelectric devices, crystal blanks.....	195,884	10,993	2,146
3344160140	Television transformers and reactors.....	(D)	15,942	94,680
3344160120, 130, 135, 110, 115, 145, 150	Coils, transformers, reactors, and chokes for electronic applications, n.e.c. ....	(D)	222,066	663,126
3344171100	Connectors coaxial.....	365,632	109,379	170,402
3344174100	Connectors, cylindrical .....	671,842	43,534	124,442
3344177100	Connectors, rack and panel .....	233,797	26,211	50,208
334417A100	Connectors, printed circuit .....	744,106	363,047	295,273
334419D102	Magnetic recording and reproducing heads.....	18,331	31,545	6,211
3344197125	Switches, rotary selector.....	55,545	87,440	93,430
3344197135	Switches, pushbutton.....	59,870	72,633	141,674
3344197120	Switches, slide, including rocker, miniature and subminiature.....	20,286	7,445	21,138
3344197140	Switches, snap-action.....	31,527	21,527	76,314
3344197130, 145, 115, 105, 110, 150, 155	Switches, other.....	672,388	668,823	1,065,685

D Withheld to avoid disclosing data for individual companies. n.e.c. Not elsewhere classified.

1/Source: Census Bureau report EM 545, U.S. Exports.

2/Source: Census Bureau report IM 145, General Imports for Consumption.

3/Manufacturers' shipments for product codes 3344131157 and 3344131160 are combined to avoid disclosing data for individual companies.

4/Manufacturers' shipments for product codes 3344140331 and 3344140333 are combined to avoid disclosing data for individual companies.

5/Manufacturers' shipments for product codes 3344140769 and 3344140772 are combined to avoid disclosing data for individual companies.

Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes, and HTSUSA Import Codes: 2002

Product code	Product description	Export codes 1/	Import codes 2/
3344114105	Receiving-type electron tubes.....	8540.81.0000	8540.81.0000
3344114110, 115, 120, 125	Television tubes, color, black and white, new and rebuilt.....	8540.11.0035 8540.11.0070 8540.11.0080 8540.12.0000	8540.11.1030 8540.11.1040 8540.11.1050 8540.11.1055 8540.11.1065 8540.11.1080 8540.11.2401 8540.11.2801 8540.11.3000 8540.11.4401 8540.11.4801 8540.11.5000 8540.12.1040 8540.12.1080 8540.12.2000 8540.12.5040 8540.12.5080 8540.12.7000
3344111110	Gas and vapor tubes.....	8540.89.0020	8540.89.0020
3344111115	Klystrons, including amplifiers, reflex, and other.....	8540.72.0000 8540.79.0000	8540.72.0000 8540.79.0000
3344111120	Magnetrons, including pulsed, fixed, tunable, cross-field continuous wave and other.....	8540.71.2000 8540.71.4000	8540.71.2000 8540.71.4000
3344111340	Light-sensing tubes.....	8540.20.2000 8540.20.4000 8540.89.0060	8540.20.2040 8540.20.2080 8540.20.4000 8540.89.0060
3344111105	High vacuum tubes, including triodes, multigridd external and internal anodes, diodes and others.....	8540.89.0040 8540.89.0080	8540.89.0040 8540.89.0080
3344117130	Electron tube parts (except glass blanks).....	8540.91.2000 8540.91.4000 8540.99.0000	8540.91.1500 8540.91.2000 8540.91.5000 8540.99.8000
3344131136	Monolithic integrated circuits, digital, memory (except silicon).....	8542.21.8091	8542.21.8091
3344131148	Monolithic integrated circuits, digital (except memory and silicon).....	8542.21.8099	8542.21.8099
3344131124, 132, 133, 142, 145	Monolithic integrated circuits, digital, silicon (except memory, n.e.c.).....	8542.21.8088	8542.21.8081 8542.21.8082

Continued

Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes, and HTSUSA Import Codes: 2002

Product code	Product description	Export codes 1/	Import codes 2/
3344131168, 170, 172	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) effect transistors volatile memory, (DRAM).....	8542.21.8021 8542.21.8028	8542.21.8021 8542.21.8022 8542.21.8023 8542.21.8024 8542.21.8025 8542.21.8029
3344131115, 182, 184, 186	Monolithic integrated circuits, digital, silicon, memory (SRAM).....	8542.21.8031 8542.21.8038	8542.21.8031 8542.21.8032 8542.21.8039
3344131192, 194	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except volatile memory (EEPROM)).....	8542.21.8048	8542.21.8041 8542.21.8042 8542.21.8049
3344131179	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors (except volatile memory (EEPROM)).....	8542.21.8058	8542.21.8051 8542.21.8052 8542.21.8059
3344131121, 139, 180	Monolithic integrated circuits, digital, silicon, memory, n.e.c. ....	8542.21.8060	8542.21.8060
3344131154	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, (except memory type, including microprocessors having an internal data bus of 8 bits or less).....	8542.21.8071	8542.21.8071
3344131157	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) field effect transistors, (except memory type, including microprocessors having an internal data bus of 16 bits).....	8542.21.8072	8542.21.8072
3344131160	Monolithic integrated circuits, digital, silicon, metal oxide (MOS) effect transistors, (except memory type, including microprocessors having an internal data bus of 32 bits).....	8542.21.8079	8542.21.8079
3344131162, 103, 106, 109	Monolithic integrated circuits, nondigital, including linear, analog, radio frequency, etc. ....	8542.29.0020 8542.29.0030 8542.29.0040 8542.29.0050	8542.29.0020 8542.29.0030 8542.29.0040 8542.29.0050
3344131118, 151	Hybrid integrated circuits.....	8542.60.0075 8542.60.0095	8542.60.0075 8542.60.0095
3344140331	Capacitors, fixed, tantalum electrolytic, metal case, including foil and wet, dipped and chips.....	8532.21.0020 8532.21.0040 8532.21.0050	8532.21.0020 8532.21.0040 8532.21.0050

Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes, and HTSUSA Import Codes: 2002

Product code	Product description	Export codes 1/	Import codes 2/
3344140333	Capacitors, fixed, tantalum electrolytic, n.e.c., including leaded (molded axial and molded radial).....	8532.21.0080	8532.21.0080
3344140436	Capacitors, fixed, aluminum electrolytic, not exceeding 35 mm .....	8532.22.0020 8532.22.0040	8532.22.0020 8532.22.0040
3344140439, 442, 445	Capacitors, fixed, aluminum electrolytic, over 35 mm .....	8532.22.0055 8532.22.0085	8532.22.0055 8532.22.0085
3344140550	Capacitors, fixed, ceramic dielectric, single layer.....	8532.23.0020 8532.23.0040 8532.23.0060	8532.23.0020 8532.23.0040 8532.23.0060
3344140555	Capacitors, fixed, ceramic dielectric, multilayer axial leads and radial leads.....	8532.24.0040 8532.24.0060	8532.24.0040 8532.24.0060
3344140560	Capacitors, fixed, ceramic dielectric, multilayer chips.....	8532.24.0020	8532.24.0020
3344140663	Capacitors, fixed, mica dielectric .....	8532.29.0020	8532.29.0020
3344140666	Capacitors, fixed, n.e.c. ....	8532.29.0040	8532.29.0040
3344140769	Capacitors, variable, mica/ceramic/glass dielectric.....	8532.30.0010	8532.30.0010
3344140772	Capacitors, variable, n.e.c. ....	8532.30.0090	8532.30.0090
3344140875	Capacitors, parts, including unfinished chips for further finishing and assembly.....	8532.90.0000	8532.90.0000
3344140103	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, less than 300 volts.	8532.25.0010	8532.25.0010
3344140106	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, 300 volts to 599 volts.....	8532.25.0020	8532.25.0020
3344140109	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, 600 volts to 999 volts.....	8532.25.0030	8532.25.0030
3344140112	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, ac types, 1000 volts or over..	8532.25.0040	8532.25.0040
3344140215	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, dc types, axial lead.....	8532.25.0060	8532.25.0060
3344140218	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, dc types, radial lead.....	8532.25.0070	8532.25.0070

Continued

Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes, and HTSUSA Import Codes: 2002

Product code	Product description	Export codes 1/	Import codes 2/
3344140221	Capacitors, fixed, paper, plastic (film), metalized, and dual film/paper dielectric, dc types, chips and other leaded devices.....	8532.25.0080	8532.25.0080
3344134105	Transistors, signal, less than 1 watt dissipation.....	8541.21.0080	8541.21.0075 8541.21.0095
3344134110	Transistors, power, 1 watt or greater dissipation.....	8541.29.0080	8541.29.0075 8541.29.0095
3344137125	Zener diodes.....	8541.10.0050	8541.10.0050
3344137120	Microwave diodes.....	8541.10.0060	8541.10.0060
3344137110	Signal diodes and assemblies.....	8541.10.0070 8541.10.0080	8541.10.0070 8541.10.0080
3344137115, 105	Diodes and rectifiers, n.e.c. ....	8541.40.6050	8541.40.6050
334413A105	Solar cell.....	8541.40.6020 8541.40.6030	8541.40.6020 8541.40.6030
334413A115, 120	Light-emitting diodes.....	8541.40.2000	8541.40.2000
334413A130	Optical coupled isolators, including sensors and emitters.....	8541.40.8000	8541.40.8000
334413A140	Thyristors, SCR's, triacs, and PNP diodes.....	8541.30.0080	8541.30.0080
334413A135	Other light-sensitive and light-emitting devices.....	8541.40.7080 8541.40.9500	8541.40.7080 8541.40.9500
334413A160	Chips and wafers for discrete semiconductors.....	8541.10.0040 8541.21.0040 8541.29.0040 8541.30.0040 8541.40.6010 8541.40.7040 8541.50.0040 8541.50.0080	8541.10.0040 8541.21.0040 8541.29.0040 8541.30.0040 8541.40.6010 8541.40.7040 8541.50.0040 8541.50.0080
334413A155	Chips and wafers for integrated circuits.....	8542.10.0000 8542.21.8005 8542.21.8010 8542.29.0010 8542.90.0000	8542.10.0000 8542.21.8005 8542.21.8010 8542.29.0010 8542.90.0000
334413A165	Semiconductor parts, n.e.c., including headers, packages, heat sinks, accessories, etc. ....	8541.90.0000	8541.90.0000

Continued

**Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes, and HTSUSA Import Codes: 2002**

<b>Product code</b>	<b>Product description</b>	<b>Export codes 1/</b>	<b>Import codes 2/</b>
3344150104	Resistors, fixed, carbon, composition or film types, designed for surface mounting (SMD) by contact, having two terminals, cylindrical leadless having two leads, carbon composition, and carbon film.....	8533.10.0042 8533.10.0070	8533.10.0042 8533.10.0060 8533.10.0065
3344150208, 212	Resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having two terminals, including both flat resistor chips, and cylindrical leadless resistors.....	8533.21.0045	8533.21.0030 8533.21.0040
3344150216, 220	Resistors, fixed, with a power capacity of 20 watts or less, surface mounted (SMD), having more than two terminals: resistor, resistor-capacitor networks.....	8533.21.0025	8533.21.0010 8533.21.0020
3344150224	Resistors, fixed, with a power capacity of 20 watts or less, wirewound, having two leads.....	8533.21.0080	8533.21.0080
3344150228	Resistors, fixed, with a power capacity of 20 watts or less, other than wirewound, having two leads.....	8533.21.0090	8533.21.0090
3344150232, 236, 240	Resistors, fixed, with a power capacity of 20 watts or less: resistor networks, having more than two leads.....	8533.10.0020 8533.10.0057 8533.21.0075	8533.10.0020 8533.10.0057 8533.21.0050 8533.21.0060 8533.21.0070
3344150468, 469	Resistors, variable, wirewound, including rheostats and potentiometers, for a power handling capacity not exceeding 20 watts.....	8533.31.0000	8533.31.0000
3344150344, 348, 359, 576, 580	Resistors, variable, n.e.c. ....	8533.39.0080 8533.40.0080	8533.39.0080 8533.40.8050 8533.40.8060 8533.40.8070
3344150684	Resistors, parts.....	8533.90.0000	8533.90.4000 8533.90.8000
3344191225, 230, 235, 240, 245, 250, 255, 260, 265	Piezoelectric devices (except crystal blanks).....	8541.60.0025 8541.60.0060 8541.60.0080	8541.60.0010 8541.60.0020 8541.60.0030 8541.60.0050 8541.60.0060 8541.60.0080
3344191270, 275	Piezoelectric devices, crystal blanks.....	7104.10.0000	7104.10.0000

Continued

Table 4. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes, and HTSUSA Import Codes: 2002

Product code	Product description	Export codes 1/	Import codes 2/
3344120105, 210, 315, 420, 425, 430, 432, 433, 435, 440	Printed circuit boards.....	8534.00.0020 8534.00.0040 8534.00.0050 8534.00.0070 8534.00.0080 8534.00.0085 8534.00.0095	8534.00.0020 8534.00.0040 8534.00.0050 8534.00.0070 8534.00.0080 8534.00.0085 8534.00.0095
3344160140	Television transformers and reactors (horizontal) output, vertical deflection, focus coils, deflection yokes, etc. ....	8529.90.3540 8540.91.2000	8529.90.3300 8529.90.3600 8540.91.2000
3344160120, 130, 135, 110, 115, 145, 150	Coils, transformers, reactors, and chokes for electronic applications, n.e.c. ....	8504.31.2000 8504.31.4035 8504.31.4065 8504.31.6000 8504.32.0000 8504.33.0020 8504.33.0040 8504.34.0000	8504.31.2000 8504.31.4035 8504.31.4065 8504.31.6000 8504.32.0000 8504.33.0020 8504.33.0040 8504.34.0000
3344171100	Connectors, coaxial.....	8536.69.4010	8536.69.4010
3344174100	Connectors, cylindrical.....	8536.69.4020	8536.69.4020
3344177100	Connectors, rack and panel.....	8536.69.4030	8536.69.4030
334417A100	Connectors, printed circuit.....	8536.69.4040	8536.69.4040
334419D102	Magnetic recording and reproducing heads, including audio, video, digital and instrumentation.....	8522.90.0010	8522.90.5540 8522.90.7540
3344197125	Rotary selector switches for electronic circuitry, including lever and jog-levers, miniature and subminiature.....	8536.50.7000 8536.50.9020 8536.50.9025	8536.50.7000 8536.50.9020 8536.50.9025
3344197135	Pushbutton switches for electronic circuitry.....	8536.50.9030 8536.50.9035	8536.50.9031 8536.50.9032 8536.50.9033 8536.50.9035
3344197120	Slide switches, including rocker for electronic circuitry, both miniature and subminiature.....	8536.50.9050 **	8536.50.9050 **
3344197140	Snap-action switches for electronic circuitry.....	8536.50.9040 **	8536.50.9040 **
3344197130, 145, 115, 105, 110, 150, 155	Switches for electronic circuitry, n.e.c. ....	8536.50.9045 ** 8536.50.9055 8536.50.9065	8536.50.9045 ** 8536.50.9055 8536.50.9065

\*\* HS codes include switches of product class 36433. n.e.c. Not elsewhere classified.

1/Source: 2002 edition, Harmonized System-based Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States.

2/Source: Harmonized Tariff Schedule of the United States, Annotated (2002).



# Appendix.

## General CIR Survey Information, Explanation of General Terms and Historical Note

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### GENERAL

The CIR program has been providing monthly, quarterly, and annual measures of industrial activity for many years. Since 1904, with its cotton and fats and oils surveys, the CIR program has formed an essential part of an integrated statistical system involving the quinquennial economic census, manufacturing sector, and the annual survey of manufactures. The CIR surveys, however, provide current statistics at a more detailed product level than either of the other two statistical programs.

The primary objective of the CIR program is to produce timely, accurate data on production and shipments of selected products. The data are used to satisfy economic policy needs and for market analysis, forecasting, and decision making in the private sector. The product-level data generated by these surveys are used extensively by individual firms, trade associations, and market analysts in planning or recommending marketing and legislative strategies, particularly if their industry is significantly affected by foreign trade. Although production and shipments information are the two most common data items collected, the CIR program collects other measures also such as inventories, orders, and consumption. These surveys measure manufacturing activity in important commodity areas such as textiles and apparel, chemicals, primary metals, computer and electronic components, industrial equipment, aerospace equipment, and consumer goods.

The CIR program uses a unified data collection, processing, and publication system. The U.S. Census Bureau updates the survey panels for most reports annually and reconciles the estimates to the results of the broader-based annual survey of manufactures and the economic census, manufacturing sector. The manufacturing sector provides a complete list of all producers of the products covered by the CIR program and serves as the primary source for CIR sampling. Where a small number of producers exist, CIR surveys cover all known producers of a product. However, when the number of producers is too large, cutoff and random sampling techniques are used. Surveys are continually reviewed and modified to provide the most up-to-date information on products produced. The CIR program includes a group of mandatory and voluntary surveys. Typically the monthly and quarterly surveys are conducted on a voluntary basis. Those companies that choose not to respond to the voluntary surveys are required to submit a mandatory annual counterpart corresponding to the more frequent survey.

### NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS), 1997

The adoption of the North American Industry Classification System (NAICS) in the 1997 Economic Census has had a major impact on the comparability of current and historic data. Approximately half of the industries in the manufacturing sector of NAICS do not have comparable industries in the Standard Industrial Classification (SIC) system that was used in the past.

While most of the change affecting the manufacturing sector was change within the sector, some industries left manufacturing and others came into manufacturing. Prominent among those that left manufacturing are logging and portions of publishing. Prominent among the industries that came into the manufacturing sector are bakeries, candy stores where candy is made on the premises, custom tailors, makers of custom draperies, and tire retreading. The net effect of the classification changes are such that if the 1997 value of shipments data for all manufacturers were tabulated on an SIC basis, it would be approximately 3 percent higher.

Listed below are the NAICS sectors:

- 21 Mining
- 22 Utilities
- 23 Construction
- 31-33 Manufacturing
- 42 Wholesale Trade
- 44-45 Retail Trade
- 48-49 Transportation and Warehousing
- 51 Information
- 52 Finance and Insurance
- 53 Real Estate and Rental and Leasing
- 54 Professional, Scientific, and Technical Services
- 55 Management of Companies and Enterprises
- 56 Administrative and Support and Waste Management and Remediation Services
- 61 Educational Services
- 62 Health Care and Social Assistance
- 71 Arts, Entertainment, and Recreation
- 72 Accommodation and Food Services
- 81 Other Services (except Public Administration)

(Not listed above are the Agriculture, Forestry, Fishing, and Hunting sector (NAICS 11), partially covered by the census of agriculture conducted by the U.S. Department of Agriculture, and the Public Administration sector (NAICS 92), covered by the census of governments conducted by the Census Bureau.)

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The 20 NAICS sectors are subdivided into 96 subsectors (three-digit codes), 313 industry groups (four-digit codes), and, as implemented in the United States, 1170 industries (five- and six-digit codes).

## FUNDING

The Census Bureau funds most of the surveys. However, a number of surveys are paid for either fully or partially by other Federal Government agencies or private trade associations. A few surveys are mandated, but all are authorized by Title 13 of the United States Code.

## RELIABILITY OF DATA

Survey error may result from several sources including the inability to obtain information about all cases in the survey, response errors, definitional difficulties, differences in the interpretation of questions, mistakes in recording or coding the reported data, and other errors of collection, response, coverage, and estimation. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to these nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is the imputing of data for nonrespondents, for late reporters, and for data that fail logic edits. Missing figures are imputed based on period-to-period movements shown by reporting firms. A figure is considered to be an impute if the value was not directly reported on the questionnaire, directly derived from other reported items, directly available from supplemental sources, or obtained from the respondent during the analytical review phase. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are suppressed or footnoted. The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is assumed to be small. The degree of uncertainty regarding the accuracy of the published data increases as the percentage of imputation increases. Figures with imputation rates above 10 percent should be used with caution.

## DATA REVISIONS

Statistics for previous years may be revised as the result of corrected figures from respondents, late reports for which imputations were originally made, or other corrections. Data that have been revised by more than 5 percent from previously published data are indicated by footnotes.

## DISCLOSURE

The Census Bureau collects the CIR data under the authority of Title 13, United States Code, which specifies that the information can only be used for statistical purposes and cannot be published or released in any manner that would identify a person, household, or establishment. "D" indicates that data in the cell have been suppressed to avoid disclosure of information pertaining to individual companies.

## EXPLANATION OF GENERAL TERMS

**Capacity.** The maximum quantity of a product that can be produced in a plant in 1 day if operating for 24 hours. Includes the capacity of idle plants until the plant is reported to be destroyed, dismantled, or abandoned.

**Consumption.** Materials used in producing or processing a product or otherwise removing the product from the inventory.

**Exports.** Includes all types of products shipped to foreign countries, or to agents or exporters for reshipment to foreign countries.

**Gross shipments.** The quantity or value of physical shipments from domestic establishments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale or use. Shipments of products purchased for resale are omitted. Shipments of products made under toll arrangements are included.

**Interplant transfers.** Shipments to other domestic plants within a company for further assembly, fabrication, or manufacture.

**Inventories.** The quantity or value of finished goods, work in progress, and materials on hand.

**Machinery in place.** The number of machines of a particular type in place as of a particular date whether the machinery was used for production, prototype, or sampling, or was idle. Machinery in place includes all machinery set up in operating positions.

**Net receipts.** Derived by subtracting the materials held at the end of the previous month from the sum of materials used during the current month.

**Production.** The total volume of products produced, including: products sold; products transferred or added to inventory after adjustments for breakage, shrinkage, and obsolescence, plus any other inventory adjustment; and products that undergo further manufacture at the same establishment.

**Quantities produced and consumed.** Quantities of each type of product produced by a company for internal consumption within that same company.

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**Quantity and value of new orders.** The sales value of orders received during the current reporting period for products and services to be delivered immediately or at some future date. Also represents the net sales value of contract change documents that increase or decrease the sales value of the orders to which they are related, when the parties concerned are in substantial agreement as to the amount involved. Included as orders are only those that are supported by binding legal documents such as signed contracts or letter contracts.

**Quantity and value of shipments.** The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to a company's own branches are assigned the same value as comparable appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

**Stocks.** Total quantity of ending finished inventory.

**Unfilled orders (backlog).** Calculated by adding net new orders and subtracting net sales from the backlog at the end of the preceding year.

#### **HISTORICAL NOTE**

Data on selected electronic and associated products have been collected by the Census Bureau since 1961 on survey MA36N, Selected Electronics and Associated Products. In 1985, survey MA36N was divided into three annual surveys which are presently collected as: MA334P, Communication Equipment, Including Telephone, Telegraph, and Other Electronic Systems and Equipment; MA334Q, Semiconductors, Printed Circuit Boards, and Other Electronic Components; and MA334S, Electromedical Equipment and Irradiation Equipment (Including X-Ray). Historical data may be obtained from Current Industrial Reports available at your local Federal Depository Library.